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ABSTRACT

The effects of a creativity training program on 18 classes of middle grade and high school level educable mentally retarded (EMR) students were investigated. Ss received instruction with a systematic set of creativity training materials for a 12-week period while 12 control group classes continued regular classwork. Criterion groups were compared on creativity test performance, attitude toward school, and exhibited creativity characteristics. MANOVA and discriminant analysis yielded significant differences favoring the experimental group on all predictor variables, supporting the contention that EMR children may possess untapped creative ability that may be improved through systematic training. (Author/CL)

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Effects and Implications of Creativity Training with Mentally Retarded Youngsters

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A number of research studies dealing with creative problem-solving indicate that this ability may be present in some degree in all people regardless of their other abilities. Intervention studies have also shown that creative performance can be modified through training (Ladner, 1971; Penney and McCann, 1962, Rouse, 1965; Tisdall, 1962), yet few such studies have been carried out with the mentally retarded.

This study was an attempt to obtain a clearer understanding of the effects of training in creative problem-solving on retarded children by applying a systematic set of training activities. The following research questions were investigated:

1. Will work with a systematic set of creativity training materials (the New Directions in Creativity program) help Educable Mentally Retarded (EMR) children to achieve higher scores on tests of problem solving ability?
2. Will exposure to these creativity training materials improve EMR children's attitudes toward school?
3. Will EMR children who have worked with these materials earn higher scores on ratings of creativity characteristics?

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Subjects

The subjects for the present study consisted of thirty groups of middle-grade and high school level EMR children who attended urban and suburban schools in Connecticut and Illinois. Of these 30 classes, 18 were randomly assigned to the experimental group and the remaining 12 classrooms were designated as the control group. Some of the groups were enrolled in self-contained special education classes and others attended resource rooms for a fixed period of time each day. The IQ range of the sample population was 50 to 80 and the children ranged in age from 10 to 16.

Teachers of the classes assigned to the experimental group were provided with the NDC (Mark I) book, a set of three rubber stamps (one happy, one neutral, and one sad face) for the students' use in evaluating their reactions to the activities, a tally sheet to tabulate student response, and a Teacher Reaction to Individual Activities form. Each teacher was asked to use the NDC activity sheets in the classroom at the rate of two per week for a period of twelve weeks. Classes in the control group carried out regular classroom activity during the experimental period.

At the end of the twelve-week experimental period, teachers of both groups were provided with creativity tests, scales, and questionnaires for each of the students in their classes. Previous experience with retarded students prior to this research suggested that the fixed time limits of the creativity tests would greatly reduce the children's quantity of responses. Such students often generate many ideas, but are frequently handicapped by their inability to write and spell and therefore may respond poorly on written tests. In consideration of this verbal handicap and the lack of established norms for retarded students, it was decided that the time limits

for all creativity measures would be removed. Teachers were instructed to allow the students as much time as they needed for each section of the four instruments, and to give writing and spelling assistance to individuals when requested. All other standardized instructions for the testing situation were retained.

Experimental Design

A posttest only control group design (Campbell and Stanley, 1963) was used to compensate for the reactive effect that has been found to be present in creativity tests (i.e., if a pre-post design is used the pre-test may influence subjects' scores on the post-test). Because of the major influence of classroom teachers on the performance and attitudes of any group, it was determined that an objective evaluation would require a comparison of individual classroom mean scores as the statistical unit. The success or failure of instructional programs often hinges on the effectiveness of the teachers involved in an intervention study (Turner and Denny, 1967); however, the use of classroom means helps to avoid errors by providing a more reliable estimate of research findings. Thus, the data reported in the tables that follow represent the mean scores of each set of group means for the 18 experimental and 12 control groups.

MANOVA and discriminant analyses were applied to the data in order to determine the most effective combination of variables distinguishing experimental from control groups. In addition to these analyses, responses to a Teacher Questionnaire and Student Questionnaire were tabulated and summarized for the experimental group in order to gain further information regarding teacher and student responses to the use of the training materials.

Results

Scores on Creativity Tests. Christensen and Guilford's tests of Ideational Fluency, Word Fluency, Alternate Uses, and Consequences were used to investigate the effect of the NDC program on measures of creativity. Table 1 presents the means and standard deviations for the four predictor variables for both groups. As this table indicates, the ranges on all four creativity tests were very wide, with the experimental group attaining the

Table 1 about here

greatest mean score in every case. When a MANOVA was conducted with the two criterion groups for the four creativity variables, the F ratio indicated that the two groups differed significantly on the battery of four creativity tests ($F = 8.81$; $p < .0002$; d.f. = 1,28), with the experimental group exceeding the control group across all four measures. The greatest mean difference between groups was seen in the Alternate Uses test, followed by Consequences, Word Fluency, and Ideational Fluency in that order. Based on the factors these tests measure, it can be concluded that the NDC program had the greatest effect on the subjects' flexibility, with significant effects on originality and fluency.

Attitude Toward School. It was hypothesized that EMR students who worked with NDC materials would have better attitudes toward school than students who had not worked with these materials. Erlich's (1969) Inventory of Attitude Toward School was scored for the following four of twelve possible sub-factors: (F_1 = Generalized Negative Affect, F_2 = Generalized Positive Affect and Enthusiasm, F_6 = Attitude Toward Teacher(s), and F_{10} = Attitude Toward Emotional Security or Anxiety). Table 2 presents the

means and standard deviations for the four sub-factors, and the total scores for each group. Again, means differed widely between the two

Table 2 about here

groups, with the experimental group consistently attaining the lower score. Since a smaller score indicates a better attitude toward school, the differences appear to favor the experimental group. The MANOVA for these five predictor variables for the two criterion groups yielded an F ratio of 6.95 ($p < .0004$: d.f. = 1,28) indicating that there was indeed a significant difference between the two groups in general attitude toward school and on the four sub-factors of the Inventory.

Characteristics of Creativity. The third research question proposed that EMR students who had experienced the NDC creativity training program would exhibit more characteristics of creative behavior than would those students of similar ability who had not worked with the program. The summary of the analysis of variance for the Scale for Rating Creativity Characteristics (Renzulli, 1971) is shown in Table 3. An overall F ratio of 9.01 resulted,

Table 3 about here

significant beyond the .01 level. These data indicate that students who participated in the NDC program received higher ratings on the Scale than control group students by exhibiting more of the behavioral characteristics of creativity measured by this Scale.

A MANOVA was performed on all eleven predictor variables and yielded an overall F ration of 9.70 ($p < .0001$; d.f. = 1,28). Following the

significant outcomes of this MANOVA, a stepwise discriminant analysis evaluated each of the eleven variables with respect to its contribution to the total discrimination between groups. The five optimum predictor variables included the Scale for Rating Creativity Characteristics, Alternate Uses, Word Fluency, the Inventory of Attitude Toward School (Factor 6 and Factor 10 respectively). In other words, these five variables had the greatest impact on the discrimination between the two comparison groups. A plotting of the individual (classroom) means and group centroids based on the discriminant analysis of all eleven variables revealed an absence of overlap between the experimental and control groups. This procedure supports the conclusion that the set of variables discriminated clearly between the two groups and that the NDC materials had a powerful effect in changing the behaviors of EMR youngsters. Considering the outcomes from the stepwise discriminant analysis, it is apparent that the treatment influenced all three of the general categories of dependent variables: divergent or creative production, attitude toward school, and creativity characteristics.

The Student and Teacher Questionnaires and other instruments used to assess experimental group reaction to the NDC program showed a generally positive response to the creativity activities. None of the teachers and very few students gave completely negative evaluations of the materials, and the constructive criticism seen in these data provided valuable suggestions for further study in this area.

Discussion

Some of the most dramatic outcomes of this study were related to the differences in creativity test scores between the experimental and control groups. The comparative mean difference between groups was greatest on the Alternate Uses test, a measure of the factor of flexibility. Since it was precisely this trait that was mentioned as a necessary attribute for adjustment to job changes and the attainment of self-sufficiency, such positive results from the short-term implementation of the NDC creativity training program lend support to the further use of such a program with EMR students. If long-term creativity training consistently resulted in flexibility gains on the part of these children, it should assume an important place in the special education curriculum.

Indications that the experimental group's attitude toward school was significantly more positive than that of the control group were noteworthy. One must be cautious in viewing the outcomes of this or any other attitude questionnaire, since the affective realm is difficult to measure empirically, and results from such a measure may be influenced by several extraneous variables. However, if more support is found for this relationship, the value of creativity training in improving attitude and lessening anxiety may be enough in itself to justify the implementation of such programs in special education classes.

The findings with regard to observed creativity characteristics of students were important in that they represented teachers' subjective judgments of students' creative abilities. Significant differences favoring the experimental group added further support to the validity of the

creativity test results. A question requiring further research would be whether or not a child could acquire more of these behavioral characteristics during the course of extensive creativity training. Data in this area would be a valuable addition to the fund of knowledge dealing with creative growth.

The lasting effects of a creativity training program on the creative abilities of mentally retarded children can only be assessed through long-term implementation of such a program accompanied by periodic evaluation of results in terms of creative growth and carry-over to other subject areas. The outcomes of the present study should give impetus to this type of research, since information regarding this aspect of the retarded child's abilities is limited at this time.

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TABLE 1

MEANS AND STANDARD DEVIATIONS FOR EXPERIMENTAL AND CONTROL GROUPS ON FOUR MEASURES OF CREATIVITY

	Alternate Uses		Ideational Fluency		Consequences		Word Fluency	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Experimental	7.56	5.12	29.91	14.84	8.87	5.92	33.05	14.23
Control	1.07	1.04	14.96	2.74	1.54	1.01	16.14	4.46
Total	4.96	4.05	23.93	11.69	5.94	4.66	26.28	11.44

Note: Each figure represents the grand mean and standard deviation for 18 Experimental Group means and 12 Control Group means.

TABLE 2

MEANS AND STANDARD DEVIATIONS FOR EXPERIMENTAL AND CONTROL GROUPS ON FOUR FACTORS AND TOTAL SCORE OF THE IVENTORY OF ATTITUDE TOWARD SCHOOL

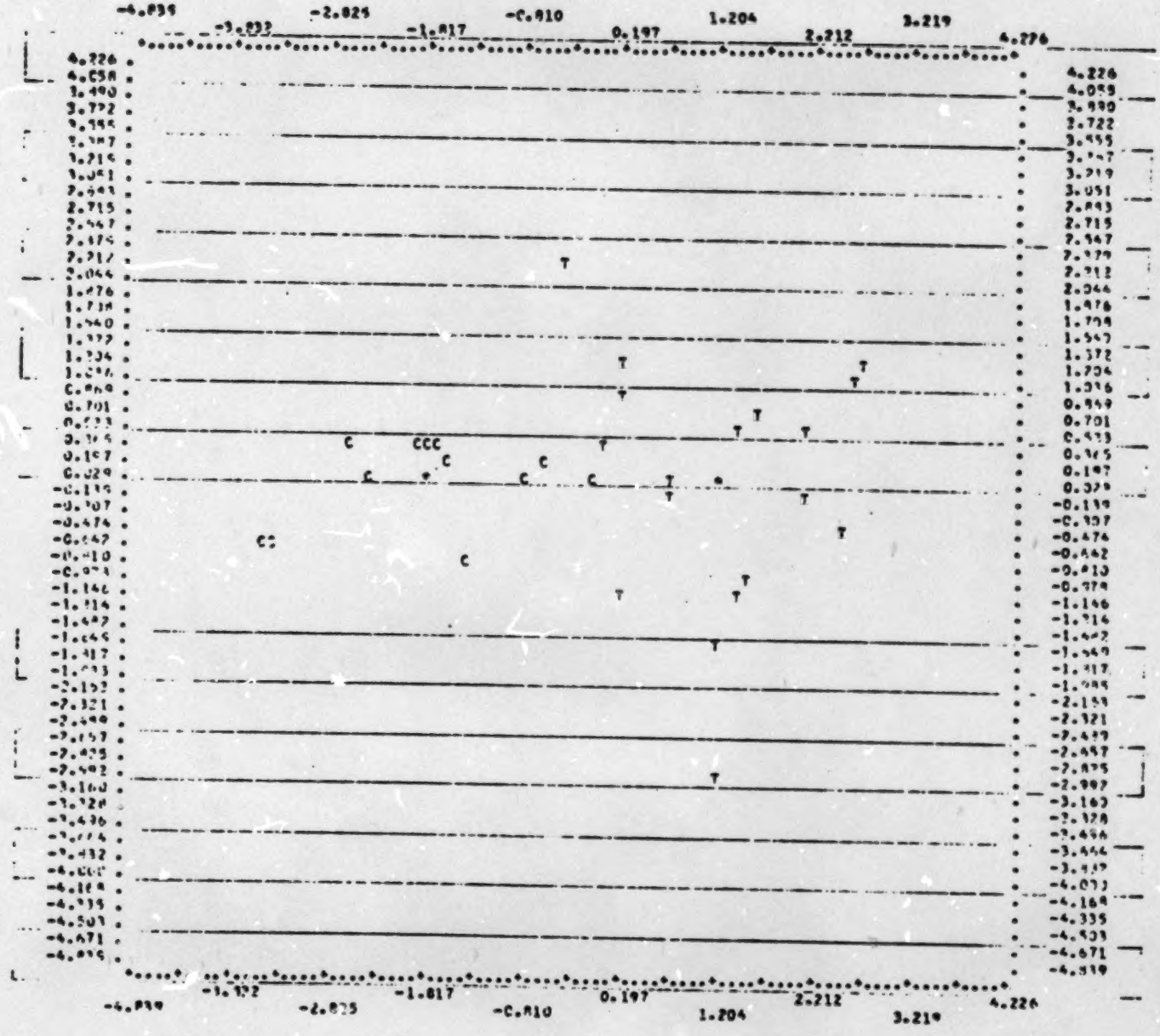
	Total Score		Factor 1		Factor 2		Factor 6		Factor 10	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Experimental	94.21	19.07	8.53	2.62	14.86	4.75	10.24	1.86	2.97	1.36
Control	113.41	16.68	12.68	3.16	13.03	4.33	14.63	3.65	4.93	1.92
Total	101.89	18.17	10.19	2.84	14.13	4.59	11.99	2.71	3.75	1.60

TABLE 3

ANALYSIS OF VARIANCE COMPARISON BETWEEN EXPERIMENTAL AND CONTROL GROUPS ON SCALE FOR RATING CREATIVITY CHARACTERISTICS

Source	Sum of Squares	df	Mean Square	F-ratio
Between	156.05	1	156.05	9.0105*
Within	484.94	28	17.32	

* $p < .01$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-0.810
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1.204
2.212
3.219
4.226